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Angiostoma spiridonovi sp. n. (Nematoda: Angiostomatidae) from *Limax flavus* (Gastropoda: Limacidae)

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ABSTRACT: *Angiostoma spiridonovi* sp. n. (Rhabditida: Angiostomatidae) is described from limacid slugs in western Europe. The new species is distinguished from other members of the genus by the lack of lateral alae, shape of the buccal cavity, and number of caudal papillae.

KEY WORDS: *Angiostoma spiridonovi* sp. n., Nematoda, Angiostomatidae, taxonomy, slug, *Limax flavus*, Limacidae, Brittany, France.

The family Angiostomatidae contains the single genus *Angiostoma* which is composed of 6 species. One species has been described in North America (Chitwood, 1933), whereas the others have been found from various terrestrial molluscs in Europe and Central Asia (Spiridonov, 1985; Morand and Spiridonov, 1989). The present communication describes a new species of *Angiostoma* from limacid slugs in western Europe.

Materials and Methods

Slugs were collected in a garden from the city of Rennes, Brittany, France. Nematodes were removed from the anterior part of the intestine. The nematodes were fixed with hot 70% ethanol and cleared with lactophenol. Figures were made with the aid of a drawing tube. Measurements given are for the holotype male, the allotype female, and a larva from the uterus of a female. Measurements in parentheses are the ranges of paratype males and females. All measurements are in micrometers.

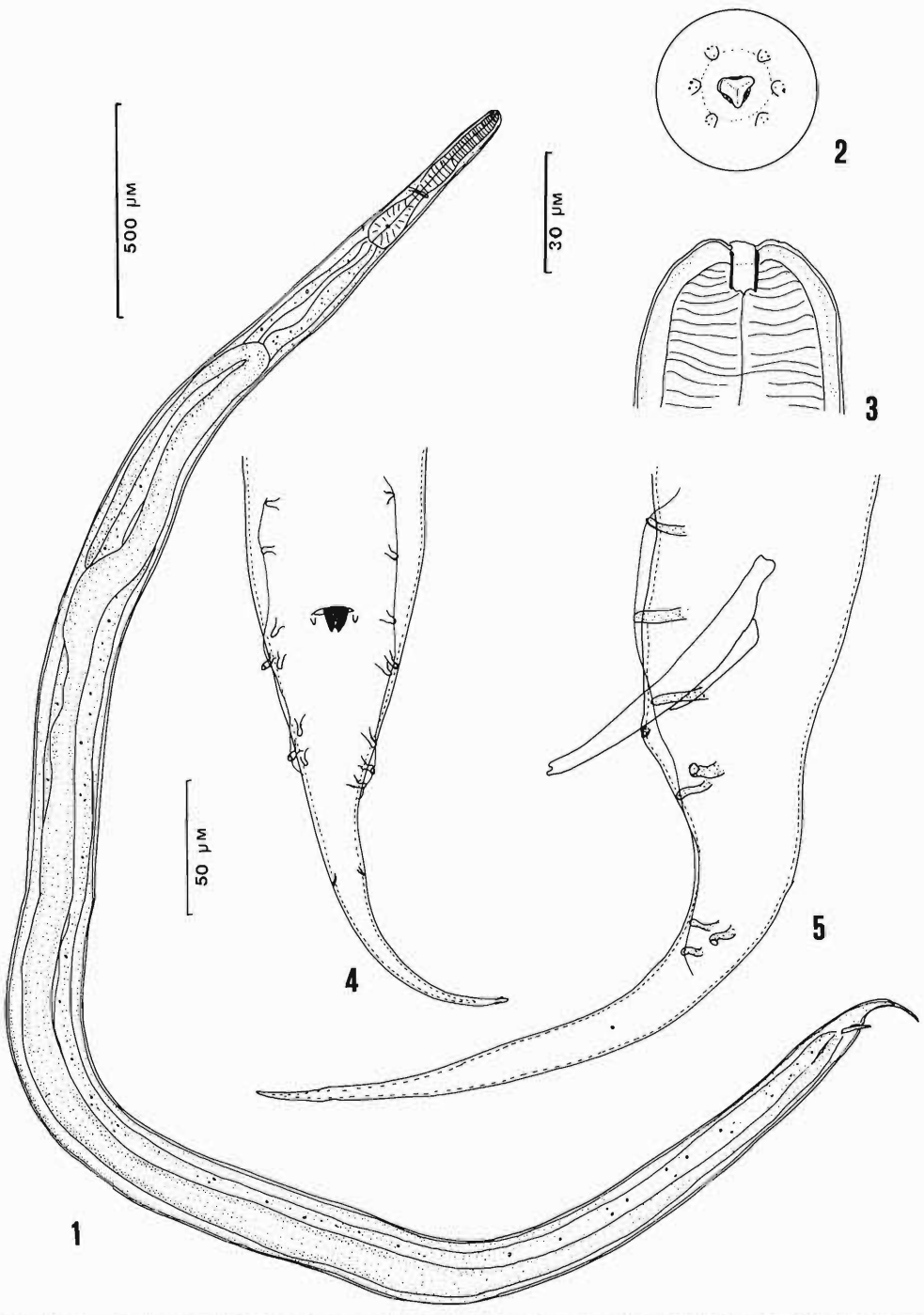
Description

Angiostoma spiridonovi sp. n. (Figs. 1–17)

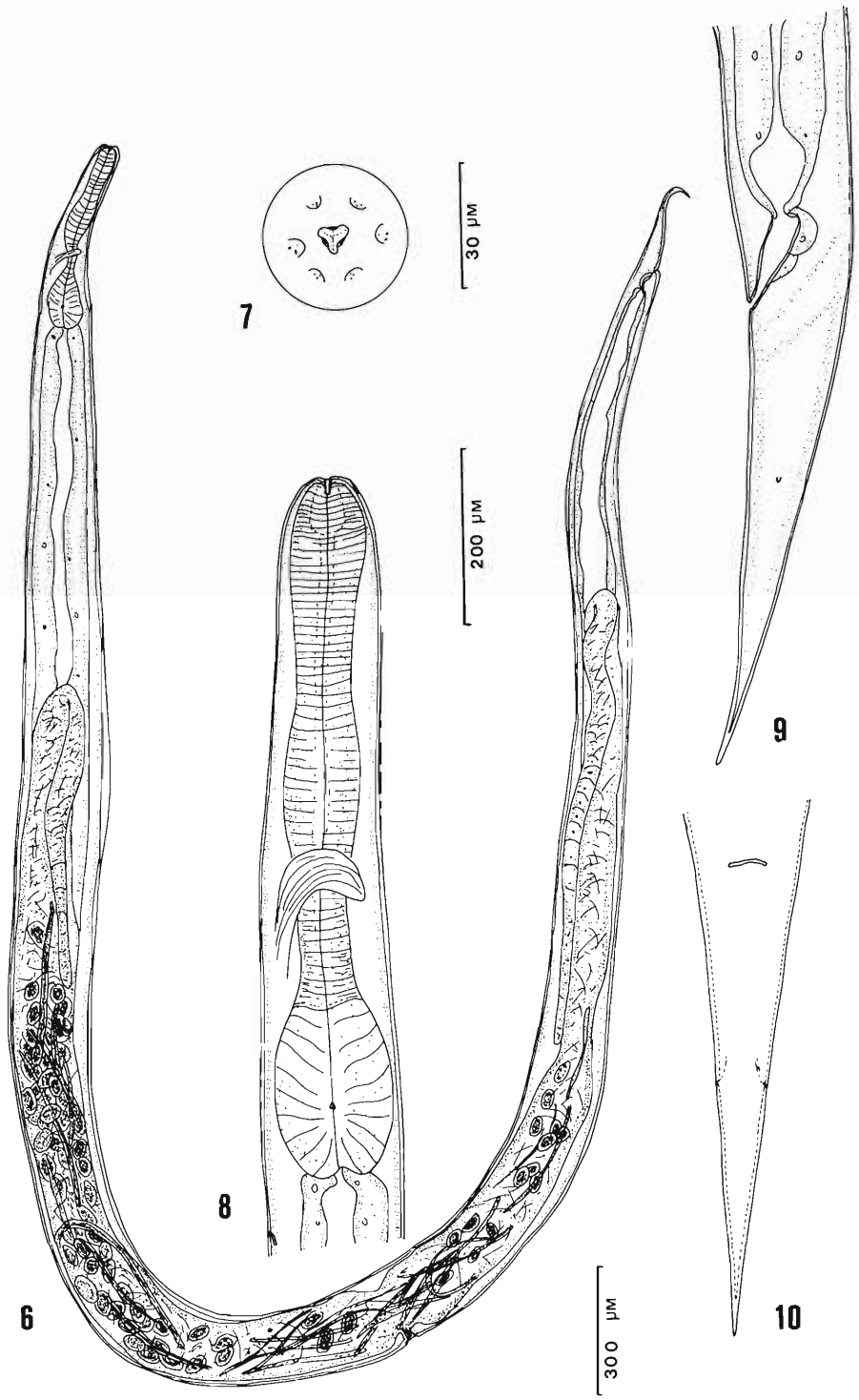
GENERAL: Nematoda, Rhabditida, Angiostomatidae, *Angiostoma*. Transparent nematodes lacking lateral alae in both sexes. Cuticle thin and nonstriated. Sexual dimorphism not prominent. Oral opening subtriangular with 3 lips. Ten papillae, 6 inner papillae, and 2 minute amphids on 6 elevations surrounding oral opening (Fig. 2). Cylindrical buccal cavity about 8 long and 5 wide (Fig. 3). Esophagus with corpus, isthmus, and bulb with minute valves (Fig. 8). Posterior extremity of corpus like a metacorpus without histological discontinuities (Fig. 8). Nerve ring at level of anterior part of isthmus. Excretory pore posterior to the esophago–intestinal junction.

MALE (holotype and 2 paratypes) (Figs. 1–5, 16): Length 2,630 (3,410–5,000). Maximum width 85 (80–100). Buccal cavity 16 (15–18) long and 8 (7–8) wide. Esophagus 320 (382–385) long: corpus 85 (90–95) long, isthmus 55 (88–70) long, and valved bulb 65 (75–105) long by 50 (55–60) wide. Nerve ring 250 (245–245), excretory pore 360 (430–440), and flexed portion of testis 660 (740–690) from anterior extremity. Caudal alae developed and supported by 8 pairs of pedunculate papillae: 2 pairs preanal, 1 pair adanal, and 5 postanal. Fifth and 8th pairs terminating on dorsal surface of bursa, whereas other pairs terminating on ventral surface (Figs. 4, 5). One pair of minute papillae immediately posterior to anus. Testis reflexed (Fig. 1). Spicules well chitinized, equal, expanded proximally, indented distally, poorly arcuate, 82 (81–91) long. Gubernaculum poorly chitinized, ellipsoidal in ventral view, 35 (36–41) long. Tail 160 (175–209) long. Phasmids 58 (70–90) posterior to anus.

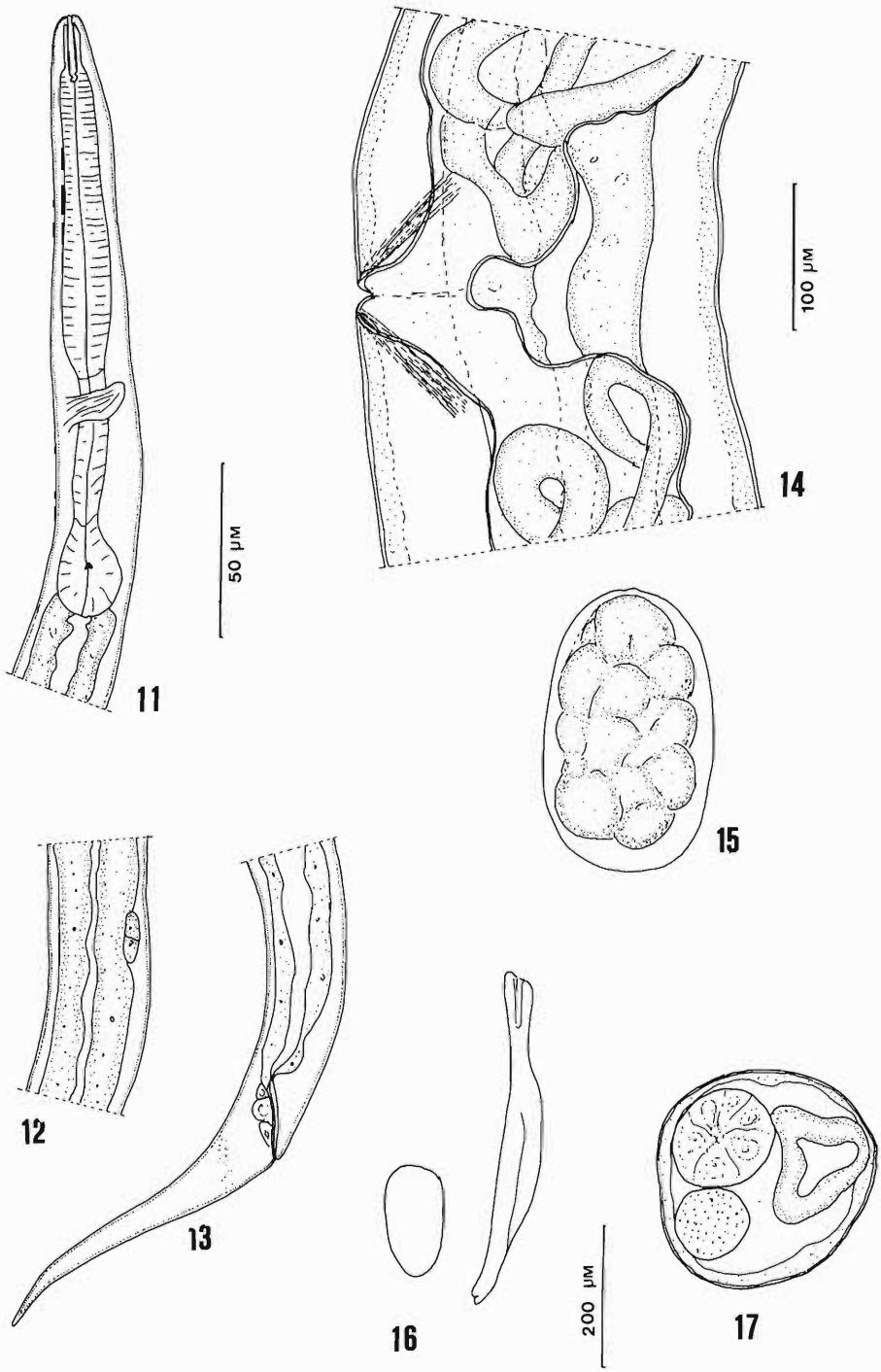
FEMALE (allotype and 2 paratypes): Length 4,080 (5,840–5,600). Maximum width 90 (110–90). Buccal cavity 10 (11–10) long and 7 (6–7) wide. Esophagus 365 (400–350) long: corpus 105 (110–100) long, isthmus 60 (65–60) long, and bulb 85 (105–72) long by 50 (72–65) wide. Nerve ring 225 (250–235), excretory pore 425 (465–410), and vulva 1,425 (2,840–2,750) from cephalic extremity. Tail elongated, 295 (260–235) long. Phasmids not conspicuous 160 (120–125) posterior to anus. Amphidelphic; uteri divergent, anterior uterus directing anteriorly, posterior uterus directing posteriorly; ovaries reflexed. Vulva in middle position leading to a short vagina (Fig. 14). Uteri contain numerous eggs 49–52 (50) by 79–93 (81) and larvae. Eggs elliptical,



Figures 1–5. ***Angiostoma spiridonovi*** **sp. n. male from** ***Limax flavus*** **in France. 1. Entire worm in lateral view. 2. Cephalic extremity in en face view. 3. Cephalic extremity in lateral view. 4. Caudal extremity in ventral view. 5. Caudal extremity in lateral view. Scale bars: 1 = 500 µm; 2 = 30 µm; 3–5 = 50 µm.**



Figures 6–10. ***Angiostoma spiridonovi*** **sp. n. female from** ***Limax flavus*** **in France. 6. Entire worm in lateral view. 7. Cephalic extremity in en face view. 8. Esophageal region, lateral view. 9. Caudal extremity in lateral view. 10. Caudal extremity in ventral view. Scale bars: 6 = 300 µm; 7 = 30 µm; 8–10 = 200 µm.**



Figures 11–17. ***Angiostoma spiridonovi*** **sp. n. from** ***Limax flavus*** **in France. 11–13. Larva removed from uterus of female. 11. Esophageal region in lateral view. 12. Middle region with genital primordium. 13. Caudal extremity in lateral view. 14. Vulvar region of the female. 15. Egg from uterus of female. 16. Spicule and gubernaculum of the male. 17. Transverse section of female through body. Scale bars: 11–13, 15, 16 = 50 µm; 14 = 100 µm; 17 = 200 µm.**

thin-shelled, containing embryos at all stages of development (Fig. 15).

LARVA (probably first-stage larva): Triangular oral opening. Cylindrical buccal cavity formed with a promesostoma, a metastoma without denticles, and a glottoid apparatus. Esophagus rhabditoid with swollen corpus, isthmus, and bulb without valves (Fig. 11). Phasmids and excretory pore not observed. Conical pointed tail (Fig. 13). Genital primordium consisting of few cells (Fig. 12). Length 637. Maximum width 28. Buccal cavity 18 long and 4 wide. Esophagus 180 long: corpus 110 long, isthmus 45 long, and bulb 25 long by 20 wide. Nerve ring 120 from cephalic extremity. Genital primordium 200 from cephalic extremity. Tail 97 long.

HOST: *Limax flavus* L., 1758.

SITE IN HOST: Pharynx.

LOCALITY: Rennes, Brittany, France.

DATE OF COLLECTION: December 1989.

SPECIMENS DEPOSITED: Laboratoire de Zoologie (Vers) Museum national d'Histoire naturelle, Paris. Holotype, allotype, and 4 paratypes. N° MNHN 118 HF.

ETYMOLOGY: The species name is dedicated to Dr. Sergueï Spiridonov.

Discussion

Six species of *Angiostoma* have been described previously: *Angiostoma limacis* Dujardin, 1845 (type species), from several species of Arionidae (*Arion ater, Arion circumscriptus, Arion silvaticus,* and *Arion subfuscus*) (Campana-Rouget and Théodoridès, 1956; Morand and Spiridonov, 1989); *Angiostoma stammeri* Mengert, 1953, from *Limax cinereoniger* and *Limax maximus*; *Angiostoma dentifera* Mengert, 1953, from *Limax cinereoniger*; and *Angiostoma aspersae* Morand, 1986, from *Helix aspersa* in Europe. *Angiostoma asamati* Spiridonov, 1985, was described from *Gigantomilax ferganus* in Central Asia and *Angiostoma plethodontis* Chitwood, 1935, from *Plethodon cinereus* in North America. The last species was collected from an amphibian, but it has been suggested (Adamson, 1986) that the salamander had acquired the infection by ingesting a parasitized mollusc.

Dujardin (1845) proposed *Angiostoma* for *A. limacis* and *A. entomelas*; the latter has been transferred to *Entomelas* Travassos, 1930. The diagnostic characters of the genus are: an enlarged buccal cavity, 6 elevations surrounding the oral opening, and a leptoderan rhabditoid bursa (Chitwood, 1933). The male bursa indicates that *A. spiridonovi* is an angiostomatid. Nevertheless, the species does not have the characteristic buccal cavity of the genus but most closely resembles free-living species of the genus *Rhabditis* (Andrassy, 1983).

The larva obtained from the uterus of a female worm has the same morphology as those from *A. aspersae* (Morand, 1989), *A. limacis,* and *A. dentifera* (Morand and Spiridonov, 1989).

The present species resembles *Angiostoma dentifera* by the triangular oral opening but differs by the absence of lateral alae in both sexes and by the number of caudal papillae in the male. *Angiostoma spiridonovi* sp. n. may be distinguished from *A. aspersae, A. plethodontis, A. asamati, A. stammeri,* and *A. limacis* in having a subtriangular oral opening, whereas these species exhibit a wide round oral opening. Also the number or the disposition of caudal papillae are different. The new species can also be differentiated from *A. plethodontis* and *A. limacis* by the presence of a metastomal apparatus.

The short and narrow buccal cavity of *A. spiridonovi,* which differs from those of all members of the genus, is an important character for the diagnosis of the species but not sufficient to erect a new genus. The genus *Angiostoma* is emended for *A. dentifera* and *A. spiridonovi*: oral opening round or subtriangular and buccal cavity large or narrow.

Acknowledgments

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SCHISTOSOMIASIS SYMPOSIUM

The Third SRP International Symposium on Schistosomiasis 14–18 February 1993, Cairo, Egypt

The Ministry of Health/USAID, Schistosomiasis Research Project (SRP) will hold its third international symposium on schistosomiasis, in Cairo, 14–18 February 1993.

Venue: Conference Hall, Nasr City, Cairo.

Registration: U.S. $150.00.

Deadline for receipt of abstracts: 31 August 1992.

Objectives of the conference:

To offer the large community of Egyptian scientists an update on the recent developments in all aspects of schistosomiasis research; and

To offer a forum at which the scientists funded by the SRP will present their results for discussion by international scientists in the field.

Program outline: The conference program will be based on the six SRP components:

—Vaccine development;
—Immuno-diagnosis;
—Chemotherapy;
—Epidemiology;
—Socio-economic aspects; and
—Operational research.

Participants: Speakers will include:

—SRP funded Egyptian scientists who will present the results of their research to date;
—U.S. collaborators with the SRP who will be invited to present results from their home laboratories;
—International scientists invited as keynote speakers in each of the six topics; and
—Free communications.

Posters: Poster facilities as an alternative to oral presentation will be available.

Social program: There will be a conference dinner, and post conference excursions to the Red Sea and Luxor/Aswan can be arranged on request.

For further details, please contact:

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